

Notwithstanding all the efforts to protect the environment at SRS, during the years of operation portions of the site have been contaminated. Groundwater beneath an estimated five to 10 percent of the site has been contaminated by industrial solvents, tritium, metals, or other constituents used or generated by operations at SRS. Releases to the environment have been well documented over the years in various environmental reports. Details on SRS environmental contamination and impacts on the surrounding environs can be found in Savannah River Site Environmental Reports, the latest published in 1998, is WSRC-TR-98-00312 [4].

### **3.0 Recycled Uranium Mass Flow**

#### **3.1 Uranium Recycle Description**

The SRS primarily received recycled uranium in metal form in its Fabrication Facilities in M-Area. Major suppliers of SRS uranium were facilities at Weldon Springs, Sylvania-Corning Co. (a private concern) Fernald, and Oak Ridge. The material was fashioned into fuel and target elements, irradiated, subjected to chemical separation to recover product and to recover usable uranium. This uranium usually in the form of Uranium Trioxide (UO<sub>3</sub>) or Uranyl Nitrate (UNH) was shipped to Fernald, Y-12, Paducah, and other minor sites to be placed back into the recycle stream. Portions of the uranium were lost to waste streams in both the fabrication and separation processes and remain on the Site in settling basins and waste storage facilities. The bulk of the UO<sub>3</sub> produced at the Site (about 20,000 MTU) remains in storage at SRS. A host of other sources including other government sites, colleges and universities, and foreign entities, also shipped small amounts of uranium to SRS. Details of shipments and receipts of recycle uranium are provided in the Sections below.

#### **3.2 Uranium Receipts**

A search of Material Control and Accountability Records indicates that from the time SRS started to handle uranium to March 31, 1999 some 54,544 metric tons of uranium were received at the site. The bulk of this material (45,342 MTUs) was received as uranium metal from Fernald. Another 180.8 MTUs of uranium metal came from the Y-12 Plant at Oak Ridge. The remainder of the uranium receipts were in the form of oxides, 864 MTUs from Fernald, 4.2 MTUs from Y-12, 5 MTUs from Paducah, and 14 MTUs from the Oak Ridge K-25 Plant. SRS receipts from other minor sites totaled 8, 134 MTUs. The receipts from the major shipping sites are shown annually by shipping site and material form in Attachment A.

#### **3.3 Uranium Shipments**

A search of Material Control and Accountability Records indicates that from the time SRS started to handle uranium to March 31, 1999 some 31,355 MTUs were shipped from the SRS to other sites within the DOE Complex. The bulk of these shipments went to K-25 (10,290 MTUs of oxide from 1955 to 1999), Paducah (9,257 MTUs of oxide from 1955 to 1999), and Fernald (8962 MTUs of oxide and scrap). Another 64.3 MTUs of oxide and scrap went to Y-12 along with 91 MTUs of solution. The remainder of the shipments was 74 MTUs of solution shipped to Fernald and 2, 617 MTUs shipped to a host of minor sites. The shipments to the major sites are shown annually by receiving site and material form in Attachment B.

### **3.4 Recycle Uranium Waste**

Waste streams from the fabrication and separations processes contained 642.8 MTUs of recycle uranium. 239.7 MTUs of this uranium in the form of solid waste was disposed of in the SRS Burial Grounds, another 287.5 MTUs in the form of liquid waste went to SRS Liquid Waste Storage Tanks. An additional 28.7 MTU of all forms of waste was disposed of between 1960 and 1963. It should be noted that the amount of recycle uranium disposed of as waste at SRS is likely to be greater than stated above, as waste records prior to 1960 were not located. A rough estimate based on production figures would indicate that approximately 86.9 MTUs of uranium might have gone to waste streams prior to 1960. Attachment C provides a description of the solid and liquid recycle uranium waste by year and type of uranium.

### **3.5 Recycle Uranium Scrap**

Recoverable recycled uranium scrap in the form of metals and process residues were collected and shipped to Y-12 and Fernald for placement back into the recycle uranium stream. A total of 6599.3 MTUs of scrap material was shipped from SRS over the years, 19.3 MTUs to Y-12 and 6580 MTUs to Fernald. These values have been included in the material shipped to Y-12 and Fernald in Section 3.3 above. Attachment D provides a detailed description of these scrap shipments.

### **3.6 Inventory as of March 31, 1999**

SRS has in inventory 22,481 MTUs of uranium metals, oxides, and solutions. Attachment E provides the on-hand uranium by material type and chemical form.

## **4.0 Constituents in Recycled Uranium**

### **4.1 Analytical Laboratories**

The following basic disclaimers concerning the information presented below are provided:

- Few documents that pertain to the analytical activities associated with the receipt and shipping of recycled uranium products exists.
- The Analytical Laboratories organization has always considered the analytical report supplied to the customer to be the record copy of the data and therefore does not routinely retain copies of analytical reports for long periods of time.
- The majority of laboratory personnel with personal knowledge of the analytical work prior to the 1970's are long since retired and many of them are unavailable to provide information.
- The information presented here has been gleaned from the memories of lab personnel (current and retired) and is by no means to be assumed definitive.
- Analytical methods evolve over time. The statements below as to the methods used probably reflect the state of the practice as it existed in the late 60's through today, but may not be indicative of the methods used in the 50's and early 60's.

For incoming feed materials, depleted and natural uranium samples were analyzed in the 320-M laboratory and enriched uranium samples were analyzed in the Central Laboratory in F-Area. Impurity analyses for other feed materials, e.g., aluminum, were performed in